Importation of malaria into the USSR from Afghanistan, 1981–89

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Between 1981 and 1989, a total of 7683 cases of Plasmodium falciparum malaria were imported into the USSR from Afghanistan, mainly by demobilized military personnel. For 23.8% of these cases the clinical manifestations appeared within a month of returning to the USSR, for 22.5% after 1–3 months, for 20% after 4–6 months, for 2% after >1 year, and for 0.6% after >2 years. For 13 patients the clinical manifestations of malaria appeared 3 years after returning from Afghanistan (up to 38 months). Nearly 69% of the patients did not take malaria prophylaxis at all while they were in Afghanistan, and 19% took chloroquine irregularly. Only 12.5% of the patients received a full course of prophylactic treatment with chloroquine before leaving Afghanistan. A total of 56% of the cases were detected during the period most favourable for malaria transmission in the USSR (May–September) and of these, half were imported into formerly malarious areas of the country. Activation of a surveillance system greatly reduced the consequences of the massive importation of malaria, to which the local vectors were susceptible.

Introduction

Both the relationship between malaria and war as well as the impact of the disease on nonimmune contingents involved in military action in highly endemic malarious areas are well known. Less is known, however, about the consequences of large-scale importation of malaria by military personnel returning to their native land where the disease never existed or which may recently have been eradicated.

In this article we report the results of a study of cases of malaria imported from Afghanistan into the USSR between 1981 and 1989, mainly by demobilized military personnel. Appraised also is the adequacy of the existing surveillance system in dealing with large-scale importation of malaria into formerly endemic areas where the conditions are still favourable for the renewal of transmission.

A similar importation of malaria into the USA occurred at the time of the Korean and Viet Nam Wars. In 1952, at the height of the Korean War, 7023 cases of malaria were recorded in the USA, but by 1954 the number of cases had fallen to 715 (8). The incidence of Plasmodium vivax malaria among U.S. troops returning from Korea was 17.5%, partly due to the high prevalence there of P. vivax that had a protracted incubation period (4).

One of the 10 outbreaks of malaria (with mosquito transmission) in the USA after the Second World War occurred in California during the summer of 1952 (35 cases); the source of infection was a serviceman who had recently returned from Korea. For 9 cases (25.7%) the early symptoms appeared within a few weeks, while for the remaining 26 (74.3%) the incubation period was long, varying from 217 days to 316 days (3).

During the Viet Nam War (1966–72), a total of 18,383 cases of imported malaria were registered in the USA, 94.2% of which were among military personnel; 81.6% of these cases were of P. vivax malaria. According to one study, 70% of the U.S. servicemen in Viet Nam did not take the prophylactic regimen regularly (2). The frequency of recurrent malaria was as high as 29%. For 99% of the patients, the onset of illness occurred within 12 months of returning to the USA and only for 18.6% of cases did the symptoms of tertian malaria appear during the first month after their return (8). Only three episodes of introduced P. vivax malaria were reported where the source of infection was believed to be returnees from Viet Nam (10).

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Findings

Before the outbreak of the civil war in Afghanistan, the incidence of *P. vivax* malaria had been greatly reduced in the USSR and *P. falciparum* malaria practically eradicated. About 47 000 microscopically confirmed cases of *P. vivax* malaria were recorded in the USSR in 1980, the majority of which occurred between May and October, i.e., during the transmission season. By 1985 the number of such cases had reached 420 000, although the true figure was probably at least twice as large, since the number of medical institutions that continued to report cases declined by nearly 60% in 1986.

Malaria had been practically eradicated in the USSR by 1960, and thereafter the majority of cases registered in the country were imported. With the arrival of the Soviet military presence in Afghanistan, a three- to fourfold increase in the number of imported cases was recorded. In 1980 only 365 cases of malaria were imported by Soviet citizens and foreigners, but in 1985, at the peak of importation of cases from Afghanistan, that number had reached 1918. At the same time, the fraction of the cases imported from Afghanistan of the total number of imported cases increased from 8.6% in 1980 to 62% in 1981, and then fluctuated between 58% and 75% over the following 8 years. Between 1981 and 1989, a total of 7683 cases of malaria that were contracted in Afghanistan were registered in the USSR. The majority of these were *P. vivax* cases, with only isolated cases of *P. falciparum* malaria.

The intervals that elapsed after leaving Afghanistan before the clinical manifestations of *P. vivax* malaria appeared in patients were as follows: up to 1 month (23.8% of the patients); 1–3 months (22.2%); 4–6 months (20%); 7–12 months (31.4%); >1 year (2%); >2 years (0.6%). For 13 patients tertian malaria appeared more than 3 years (up to 38 months) after their return to the USSR. Analysis of the case investigation cards of malaria patients indicated that only 12.5% had taken a prophylactic course of primaquine prior to returning home, the same proportion had taken regular chemoprophylaxis during their stay in Afghanistan, while 19% took it from time to time. Those individuals who contracted malaria had usually visited several regions of Afghanistan, thus making it impossible to distinguish the special features of the *P. vivax* strains from different regions of the country.

Between January and April only a few cases of malaria were recorded among returning military personnel, with the greatest number occurring between May and September. Among those who returned between May and August, the symptoms appeared during the first month or first few months, and only for a few cases did they occur during the following year. For those who returned to the USSR between September and December, most of the cases occurred between June and August of the following year. The number of late relapse cases therefore peaked at 7–12 months after the initial infection, indicating that the majority of infections had been contracted in August–September of the previous year. These conclusions are in agreement with the reported increase in incidence of tertian malaria in northern Afghanistan between August and October and between April and mid-May (6). A total of 56% of cases were reported between May and September (Fig. 1), half of which were imported into formerly malarious rural areas. This clearly indicates the danger presented by the imported cases, since in the central belt of the former USSR the transmission season is from the end of June to August and in the south of the country from the end of May to October (9).

The most effective vectors of malaria in the former USSR are *Anopheles sacharovi*, *A. superpictus* and *A. pulcherrimus*. Other vectors are *A. maculipennis*, *A. martinius*, *A. atroparvus*, *A. messeae*, *A. hycanus*, *A. melanoon*, *A. claviger* and *A. plumbeus*. According to Daskova & Rasnicyn most of the mosquito vectors in the former USSR are capable of transmitting imported *P. vivax* malaria, but not *P. falciparum* (5).

The consequences of the importation of tertian malaria into the USSR are interesting. There were no fatal cases of tertian malaria over the 9-year period 1981–89; though 28 cases of transfusion malaria were reported among blood donors returning from Afghanistan. Only one drug addict contracted malaria from an Afghan veteran through the use of a contaminated syringe.

The greatest danger lies in the risk of mosquitos transmitting the infection from the imported cases.

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Fig. 1. **Number of cases of malaria imported into the USSR from Afghanistan by month of onset, 1984–89.** Broken lines indicate the transmission season in the USSR.
Over the period 1981–89 a total of 36 people from 28 locations in the USSR contracted malaria in this way, though the disease did not spread any further to local inhabitants. Comparable findings were reported by Schultz for the USA: after the end of the Second World War there were 10 outbreaks of malaria involving 59 people, with no further transmission in the foci (8). It was concluded that in the USA the epidemic process was arrested because of the limited human contact with mosquitos arising from a high standard of living and the surveillance activities that resulted in the prompt detection of cases, their treatment, and the application of focal control measures.

Discussion

The potential danger of the large-scale importation of P. vivax malaria into the USSR from Afghanistan was realized at the outset of the conflict there. In order to reinforce ongoing vigilance activities, the USSR Ministry of Health issued directives informing the public health services in the republics about the expected increase in the number of imported cases of malaria and the possible consequences of such importation, particularly in previously malarious areas. The directives specified the need to conduct, on an annual basis, seminars on malaria diagnosis and treatment for general health service staff, most of whom had had very limited experience of the disease since its eradication in the 1960s. Also, preventive services were briefed on how to trace returnees from Afghanistan, to organize their treatment with a prophylactic course of primaquine, to conduct follow-up observations and, if necessary, to apply antimalarial measures in foci. In addition to these directives local health authorities received the annual surveillance reports, which contained information on the importation of malaria into the USSR, and an analysis of shortcomings in the work of health services on the detection, diagnosis, and treatment of the disease. As a result of these measures, 67% of the malaria cases imported into the USSR from Afghanistan were detected 1–3 days after the patient fell ill, while a similar interval elapsed for a definitive diagnosis to be made after the patient had made contact with the medical services. Because the source of infection remained in the community for only a short time before the initiation of treatment, the likelihood of mosquitos becoming infected and transmitting the disease was low. Nearly 74% of the patients were assigned a preliminary clinical diagnosis of tertian malaria, while the remainder were initially diagnosed as viral (21%) or intestinal infections (5%). The preventive measures used have subsequently proved to have been sufficiently effective. Although there were 36 reported cases of malaria caused by transmission by mosquitos from imported cases in 29 localities of the country, in none of the foci was there any secondary generation of cases, except in some areas of Tajikistan that bordered Afghanistan, where cross-border transmission was established.

Our observations on malaria imported into the USSR from Afghanistan, as well as those made in the USA during the Korean and Viet Nam Wars, suggest that the antimalaria measures adopted by armies operating in highly endemic areas are unable to prevent importation of the disease by demobilized military personnel when they return to their home countries. In all these instances, there was considerable importation of malaria, particularly of P. vivax infections. A high rate of importation of P. vivax cases is only to be expected from Korea and Afghanistan, where vivax malaria was the predominant form. Surprisingly, a more or less similar picture was observed for importation of malaria from Viet Nam, where P. falciparum infections were the main cause of high morbidity and mortality in the U.S. Army. This similarity arose because the chloroquine-resistant P. falciparum infections acquired in Viet Nam manifested themselves shortly afterwards, often before the personnel were sent back home or discharged from the army (8). Although in all three wars attempts were made to organize radical treatment with primaquine before the demobilization of the troops or immediately upon their return from endemic areas, the high number of imported cases of malaria suggest that, even among relatively well-organized populations such as army personnel, mass prophylactic treatment with primaquine was not as successful as might have been expected; operational problems and lack of compliance were responsible for the failures. Among veterans of the Afghan War and the Korean War, delay before the clinical manifestations of tertian malaria appeared ranged from a few months to a year or more in a substantial proportion of cases. Although a high prevalence of P. vivax malaria with a long incubation period among cases imported from Korea would be expected, the high percentage of such cases imported from Afghanistan requires explanation.

Studies in northern Afghanistan at the end of the 1980s suggested that there had been a considerable increase in the number of cases of P. vivax malaria with a long incubation period. According to estimates made by Rybalka & Ermishev the number of such cases was nearly equal to that of cases with short incubation periods (7). Probably these changes have occurred under the pressure of the extensive antimalaria measures carried out in Afghanistan at least 20 years before the outbreak of the civil war, resulting
in the selection of a *P. vivax* subpopulation with a long incubation period.

The importation of *P. vivax* malaria into formerly malarious but still very receptive areas of the USSR also confirms observations made in other countries — constant and, in some instances, intensive importation of malaria will not lead to re-establishment of the disease provided the health services are alert and capable of carrying out efficient vigilance activities.

Résumé


Entre 1981 et 1989, on a dénombré 7683 cas de paludisme à *Plasmodium vivax* importés d’Afgha- nistan en URSS, principalement par les troupes démobilisées. Dans 23,8% de ces cas, les manifestations cliniques du paludisme sont apparues dans le mois qui a suivi le retour, dans 22,5% des cas dans les 1 à 3 mois, dans 20% des cas dans les 4 à 6 mois, dans 31,4% des cas dans les 7 à 12 mois, dans 2% des cas plus d’un an après le retour et dans 0,6% des cas plus de 2 ans après le retour. Chez 13 sujets les manifestations cliniques du paludisme sont apparues 3 ans après le retour d’Afghanistan (maximum 38 mois). Près de 69% des malades n’avaient pris aucune chimio- prophylaxie lors de leur séjour en Afghanistan, et 19% avaient pris de la chloroquine mais de façon irrégulière. Seuls 12,5% des malades avaient reçu un traitement prophylactique complet par la primaquine avant de quitter l’Afghanistan. Au total, 56% des cas ont été détectés entre mai et septembre, c’est-à-dire au cours de la période la plus favorable à la transmission du paludisme en URSS, et la moitié d’entre eux ont été importés dans des régions anciennement impaludées. La mise en place d’un système de surveillance reposant sur la sensibilisation du corps médical et l’adoption de diverses mesures préventives a fortement réduit les conséquences d’une importation massive de paludisme, auxquelles les vecteurs locaux étaient sensibles. Grâce à ce système, 67% des cas de paludisme ont été détectés 1 à 3 jours après le début de la maladie. Le diagnostic clinique préliminaire était de fièvre tiède dans 74% des cas, d’infection virale dans 21% des cas et d’infection intestinale dans 5% des cas. Malgré la présence de 36 cas notifiés de paludisme transmis par les moustiques à partir des cas importés dans 29 localités d’URSS, dans aucun de ces foyers il n’y a eu de flambée de cas secondaires, à l’exception de certaines régions du Tadjikistan limitrophes de l’Afghanistan, où une transmission transfrontalière a été mise en évidence. On a également dénombré 28 cas de paludisme transfusional chez les donneurs de sang rentrés d’Afghanistan et un cas de paludisme chez un toxicomane contaminé par échange de seringue avec un soldat de retour d’Afghanistan.

References